

1. GAP ANALYSIS BETWEEN INDIAN INSTITUTES AND THEIR COUNTERPARTS ABROAD

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Synopsis

Where does India stand in the world list in higher education? Why thousands of students every year go abroad for advanced learning? What do they teach which we do not? How are their institutes different from Indian? Where do we go wrong? We have too much of rote learning. They have more of innovation, creativity. All teachers abroad hold doctorate degree, where as in India very few. Why coaching industry in India is booming? Nalanda and Taxshila were the first universities of the world, where scholars used to come from abroad. Now why a shift in culture has taken place and students going abroad? It is essential at this juncture of time to make introspection and learn from the world experience in science and engineering education, and derive lessons. The future of youths depends on knowledge rather than the resources. Status of India in world, in leadership, income level, and well being of people depends on its scientific and technological capability. India, to cope with challenges will have to enlarge the scope of institutions to cover research, innovation, creativity, generation of theories, technology creation, patent and IPR, creation of New Technology Based firms etc. What value we attach to above in budgeting? Students studying today in universities are tomorrow's leaders, in politics, industry, academics etc. They sit in parliament, board room, write books, become creative thinkers, and drive the society to progress. For India to win in world economy they have to be competitive by world standards. They have to learn not only known knowledge but learn to discover unknown. Remember! To be able to have world class leaders tomorrow we have to have today world class professors and world class institutes. The article presents in brief, the gap analysis in respect of visions and missions; policies and practices; organization structures, systems and procedures in India and their counterpart institutions in developed countries. They are critical to the success. IITs were set up under foreign collaboration. Their visions, missions, policies and practices are molded on global lines. Hence they could shine. The paper observes that rest of the Indian higher education is far too behind. India will have to capitalize on emerging technology to fulfill people's needs. Institutions will have to have wellsprings of new knowledge like in developed countries and not remain mere reflection centers. The gap analysis presented here makes an attempt to find answers to the questions raised above.

1. Introduction

Importance of academic institutions in today's time is very high. It is those which are furthering human civilization to greater heights. It is those who provide new knowledge, new

theories and new technology to industry, government and the total economy. This in turn creates wealth and comforts for people. Industry, society and government in return provide funds to academics to make it grow. India and for that

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matter any nation can be richer only by advanced knowledge. There is no other way. Academicians ought to work in public interest. Some times the government and industry are too selfish damaging interest of public at large. Academicians therefore ought not to work in the selfish interests of industry or government. For this they have to be autonomous although they receive funding from government and industry. World experience tells us that academics grow best only when it is autonomous.

This is a time characterized by change. The world under the forces of globalization is changing fast. Institutions would have also to change. They shape the future of human kind. Only those who change to innovate and again innovate tend to educate the youths on correct lines. Students now demand world class education. Institutions in India will have to be competitive by nothing less than world class so as to remain in service. Otherwise foreign universities will come here and capture major share of education market, or students will keep going abroad.

People in India are as intelligent and hard working as elsewhere in the world. However, today their efforts do not bring fruits as much as their counterparts. Per capita income is around only 600 dollars where as that of USA is 30,000 dollars. It is 50 times more. Do they work 50 times more than us? 30 % people in India, live below the poverty line. It is mainly because of the lack of new visions of new world. They lack education, relevant to the current needs. The systems employed in India in education and all other walks of life are less efficient than those in developed countries. Indians when they migrate abroad they are found to contribute far more. It is the efficiency of systems which matters. We are spending resources and efforts on education but because of outdated systems output is less. Indian students study so much with less relevance. Foreign students study so little but with high relevance. This makes them more competitive. Our visions and missions, policies and practices, systems and procedures

need examination in the light of world proven policies and practices. They need substantial improvement. Hence is the importance of gap analysis.

3. IDENTIFICATION OF GAPS, AND THEIR ANALYSIS

The paper presents only critical gaps which demand immediate attention. They are presented with a constructive approach. Criticism is made with a view to improve.

3.01. Creativity, Discovery, innovativeness is the character of institutes abroad. Is it so in India?

In an article written by an American author in the journal, "Fortune". The author was addressing the question, "Can India ever compete with US in software business?" To answer the question he made an analysis of higher education in both countries, and recorded his observation that Indian system is rote learning that is to say mechanical, stereo type based on memorization and not creative thinking. Students are taught sunset knowledge. Institutions in India do not produce new knowledge, new theories. Students are not learning innovation and hence they do not know how to discover unknown. They are reflection centers teaching that knowledge which comes to them from developed countries. It does not focus on creativity, discovery and innovation. He came to the conclusion that Indian institutions can produce at best followers in technology but not leaders. On the other hand, thrust of US universities is on producing leaders, discoverers, creators, who obtain patents and intellectual property. It is US which are pumping new technology most in the world market. He said student's education in universities and colleges is an enabler to competitiveness of software industry. A nation creating followers can never compete with a nation creating leaders, unless it changes in future. Universities in India need to incorporate creativity in syllabi and aim to produce leaders.

Another study from Duke University was examining if there is a threat from India to US competitiveness. It observed that today the quality of Indian engineering schools is by and large poor. The number of M Tech and PhDs who are crucial to technological innovation are too few and so India is far too behind in innovation. It concludes by saying that India on account of poor higher education does not pose a challenge to US competitiveness in near future.

3.02. Universities abroad have been upgraded as birth places, that is to say maternity homes, of New Technology Based Firms. How many of our universities do this?

MIT Boston is giving birth to as many as 50 companies every year. Presented by there are more than 3000 companies which owe their origin to MIT. Each Australian university, each one is giving birth to 40 companies every year. Chinese universities of late are also doing the same. Why Indian universities can not? How many companies are born in Indian universities? Do they have this vision at all? Where do our institutes stand in comparison with their counterparts? In the recent past IIT Mumbai has set up a Technology incubator, Business incubator. It has started spinning off hi-tech enterprises. Employment Generation, income generation depends on generation of New Technology Based Firms. It is these companies which provide new life and blood to industries and keep them technologically up to date. This gap needs to be filled up with priority. Indian Universities need to take a drive to adopt new visions as their counterparts to install a mechanism for spinning off companies. It is reported that IISC Bangalore has recently made collaboration with MIT Boston in this respect.

3.03. Institutes abroad display patents for sale in Industrial Exhibitions.

Do we do that? Patents are unknown to institutions in India. It is good to do research but it is essential to make commercial

exploitation of the findings of research. This makes research financially more viable, attracting more funds. Today, the economic returns obtained from research done in India are far too few. This has been our weakness, and so actual funding for research does not grow.

A few years ago Hannover Industrial Exhibition had a pavilion meant for universities and colleges. It was most crowded by the visitors. Students were explaining the new researches, emerging technologies like, patents and IPR to visitors. Universities had come from world over to display. Visitors wanted to know the technologies of tomorrow. In India how many institutions have obtained patents and participated in industrial exhibition? Students do research for PhD, M Tech. Thesis remains in library. It is published in journals and is harvested by foreigners for obtaining patents. We do not exploit research done commercially. Even the traditional knowledge about Haldi, Turmeric, Ayurvedic medicines, Wheat etc are converted in to patents by USA. We need to build this culture in our education. If the young students learn this they follow in future career. Attempts by Technology Information and assessment Council [TIFAC], New Delhi, are being made to popularize patent, IPR. It has yet to reach universities and colleges. We need to protect our research findings before publication by patenting and convert it in money. Research is a wealth generating mechanism provided it is converted in to patents, IPR.

Institutions in India today are distinctly a technology follower. They do not lead; do not give birth to new technology. They are by and large inward looking, restricting to class rooms and not going beyond. They lack the world vision. They are not enabled to think and act in this direction, the situation needs correction.

We need to install patent IPR centers in each institute and display patents in exhibitions. Industry is keen on knowing emerging technology. Institutes should aim at that. Visions of our institutions need to be enlarged, to go

beyond to what their counterparts else where in the world are doing.

3.04. Institutions abroad are in driver's seat. Indian institutions are followers like bogies of a train

A friend of mine 25 years back went to USA. He studied MS, PhD and then started a company in Silicon Valley. He returned to India after a gap of 25 years, we received him on the airport at Mumbai. He was curious to know about the progress made by India. We were driving by car to Pune. He was happy to see the new high way, as good as in USA. When we came to Pune I was telling him now we have entered Pune. He was not able to see any signs of his time on roads. He would not believe that this is Pune. He said how Pune can change so much, beyond recognition. We came to Deccan Gymkhana, yet he was not ready to believe that this was Pune. Then we came to Laxmi road. He did not see a single bicycle, which at his time used to be crowded. Then we came to railway station. He did not see a single horse tanga. He refused to accept that it was Pune. Then we brought him to the college where he studied. Immediately he exclaimed, now I can not refuse. He said whole city has changed but his college has not. He said in USA Cities change because of institutions. In India, institutions are followers of change.

Institutions in India, instead of becoming an engine have become bogies. This, he said, is an unfortunate situation. Legitimately institutions should have to initiate changes in society. Institutions need to have attitude to shape the development. Only those cities are well developed where universities are having such visions.

3.05. Institutes abroad have Innovative Character. They produce far more captains and Generals [M Tech, PhDs]; we produce more soldiers, [B Es.] Teaching Assistantship and Research Assistantship in India are almost absent

Visited to more than two dozen universities in Germany, China, UK, US. revealed that they are in the pursuit of discovery, research and innovation. Their center of gravity is on post graduation and Doctoral studies. They produce far more graduates of advanced degrees. They produced more captains and generals. We produce more of soldiers. They produced around 7720 PhDs 2006 where as in India in only 5000 register for PhD, many of them are in service lecturers from little known colleges. There are no schemes like teaching assistantship and research assistantship in many universities, to attract the fresh scholars. This is a serious short coming of our education.

It is on account of advanced courses offered in the institute the quality of UG becomes superior. They teach sunrise knowledge and sunrise technology. According to the report of G Bush Commission, namely "Science the Endless Frontier", research is the main function of university and teaching is a byproduct. Teaching without research leads to irrelevance, and obsolescence. In India what is the status?

Many universities in India teach sunset technologies to students. Institutions are behind the time. According to Mckinsey Report published recently only 30 % of the engineering graduates are employable. Government has now proposed, "Finishing schools" in IITs and NITs to educate half baked graduates coming out of universities. From NASSCOM to CII, everybody is crying hoarse about the quality of our technical manpower.

Education to policy makers is necessary to make institutes innovative like abroad. Policy makers should enable the professors to be innovative and produce more of M Techs and PhDs that is to say captains and generals. This is a major point of difference between Indian institutes and their counterparts abroad.

3.06. Size of Institutions abroad is large and economical. In India it is small and uneconomical

National University of Singapore has 350 acres of land but it has 1900 professors and 32000 students. MIT Boston has about 500 acres of land and 40000 students with 3000 professors. Georgia Tech University has 20000 students and 1000 professors. Karlsruhe University in Germany has 30,000 students and 2000 professors. Our universities by and large are pigmy in size. They have big land of the order of 1000 acres but students and professors are far too few. Pankaj Jalote in one of his articles has advocated scaling up the strength of students in IITs from 4000 to 10000. Courses offered are stereotyped besides too low in number. Most of the universities like Pune Mumbai in their campuses have too few students and faculty. Aurangabad University for example has 500 acres of land, has 1000 students and has only 100 faculty strength. The size of our institutes is uneconomic. They are over capitalized in terms of land and buildings. Universities abroad open at 8 in the morning and remain open up to midnight. We open at 10 in the morning and close at 5 pm. There is a big difference in libraries. They are far too behind. Capacity utilization of installed facility in India is too small. Private colleges in engineering are like small "pan shops" without PG and PhD education. There are no well springs of knowledge in the institutions. They depend on borrowed knowledge. The scope of our institutions needs improvement. They need to see what is happening elsewhere in the world and do benchmarking.

3.07. They have patent IPR culture. Do we have?

How many of our universities and colleges have patent culture? MIT Boston every year obtains around 100 patents. The institute has a Technological Licensing Office with 200 people working in it. There is a trend of commercialization of new technology in almost every university. It is a source of income to the professors, students and the institute. Many universities in Germany, UK have patent departments. In fact their performance is

measured in terms of how many patents are obtained and the revenue earned. They have Technology Incubators, Business Incubators, Research Parks and Venture Capital Firms available in campus. Students develop skills of innovation and patenting in them. This is our serious weakness. This is one of the important reasons why Indian students go abroad. We need necessarily to learn from international experience abroad.

3.08. They give high priority to education in national budget. What priority we give?

Education is not accorded the priority it deserves in national budget. It does not get budget as their counterparts. India spends around 3% only where as developed countries spend around 10 % of GDP. Budget allocation to R&D in India is only 0.8% of GDP where as in China it is 1.5%. Papers published and patents obtained in China are ten times larger. Less number of people and that too poorly are therefore educated. This adversely affects the quality of leadership in all walks of life. Technological content in economy is far too low. It is to be realized that it is education which makes a man competitive. Without education he is less than an animal. Nobel Laureate Dr Amartya Sen recommended increasing budget on education. The then Finance Minister Mr. Yeshwant Sinha asked him what should be the first priority in budget. He replied Education. Then he asked what should be the second priority? He again replied, "Education". Then he asked, what should be the third priority? He replied again "Education". Will the Government care for his advice?

3.09. Strategies employed by Policy makers in education in India are outdated.

They are far too behind the world. The strategies have almost no strength to take the nation forward. Research subsidizes education and education subsidizes research. Research

and education are complementary to each other. This world proven fundamental strategy is not adhered to. The strategies are not strong enough in world comparison.

There is a story of two armies which were fighting with each other. One army had a lion as its captain, but the soldiers were sheep. The second army had a sheep as its captain and lions as soldiers. The lion captain employees bold strategies. The sheep captain, designs strategies like a coward and loses even though his soldiers are lions, because the soldiers have to follow the strategies drawn by the captain. It is the strategies which enable the army to win. Situation in India is something like this. We have a strong base of intellectuals, and academicians but strategies which are drawn by leaders in bureaucracy and leaders in politics are weak. Academic leadership as a result at national/ state/ institution levels is crippled. Students of today are tomorrow's leaders. To have good leaders tomorrow we have to have good institutions today. Shivaji had much smaller army than Aurengzeb but still he could win, because he employed better and bold strategies like a lion. Higher education in India needs bold strategies to reform to world class level. There is a greater need to shed the mental weakness in academicians. They need to be enabled to grow at par with their counterparts abroad.

3.10. Brain Power is nursed abroad. It is wasted in India.

Brain power is said to be more powerful than any other power, like money power, political power, electrical power etc. Demand for knowledgeable people in globalized world is sky rocketing. SEZs and industrial development plans demand people with skills like research, innovation, entrepreneurship, patenting and IPR. Nations which understand the dynamics of world market and match it with institutions will win. Others may work hard, spend resources but will lag behind in brain race. Those who take strategies in favor of nursing brain power tend to win.

We have to recognize the importance and work with knowledge, IPR rather than muscle. Salaries of only a few in industry are sky rocketing. Many on the other hand are jobless. They have brains but under nourished. The dichotomy can be resolved only by upgrading the institutions.

3.11. Academic freedom is the right of students and professors abroad. In India professors are servants without any Academic Freedom. Students have no choice than to learn what is handed over to them.

Institutions also do not have academic freedom. They have become puppets in the hands of Government. Independent thinking and decision making is not allowed. CAFETARIA approach courses are not run, although badly needed. Industries are varied in nature and so are their manpower needs. Coaching class industry is booming, because courses are standardized stereotyped, giving birth to mediocrity.

Institutions essentially should not have to go too close to industry or too close to government. They have to academic freedom to be able to play their legitimate role as critic. Academicians have to work in larger public interest, for maintaining a healthy national economy. They should not have to bend before industry or government. Indian economy is a low income economy mainly because of lack of autonomy. It should forth be made autonomous.

Universities, institutions and private colleges have become the prisoners in the hands of Government. Non educational principles and strategies in government are guiding the educational people. In fact it should be the other way round. They are subject to whims and fancies of government. They change every five years when new party comes to power. Government is not best qualified to govern education. Government should make only legislation for which it is meant. Long range

policies and practices in education in India need be made by professionals considering the trends in world.

3.12. Research is main focus abroad. In India it is lacking.

Research is given back seat in higher education. Professors have no research grant. Institutes and universities have become teaching shops. Professors teach sunset knowledge coming from abroad. Professors and students have no budget for research. They teach learn parrot like which was taught to them ten years ago. Neither the teachers nor students are trained to learn to discover what is unknown. Unfortunately teaching and research have been segregated from each other. This leads to weakening of both. This is not the way to build a nation. They therefore remain followers. Research must become the core function of an institution.

3.13. Institutions are governed in India by those who have low value for Academics.

Privatization of education is good provided it is governed by those who have value for academics. In most of the cases it is the politicians who do not understand it sit on the governing board. Today, education barons have usurped the powers of academicians. Professors have become humble servants. They have no freedom to think and freedom to act. They have no budget for research. While money earned in colleges is siphoned for political purposes. This is too damaging for the future of children and grand children. That is one of the main reasons why brain drain from India is rampant.

Education barons have brought unethical commercial trends in education. Government is a party to it. Thinkers have no place in education. Nobler aims of education are thrown to winds. Bottom 50% of population, because fees are high, do not have access to higher education. Upper 50% population is mediocre but wealthy and so gets access to higher education. India with such policies will stand to lose in long range

in brain race. The fabric of Indian culture is likely to be damaged. At a time when the level of education needed for productive employment is increasing, opportunity to go to college to bottom half population is decreasing. The common man is getting a feeling of betrayal, causing resentment which may lead to discontent, instability, even riots, which may be very costly. The present policies are an invitation to Naxalite movement. Education institutes can not and should not be run on commercial lines like General Motors. Public interest is being sacrificed by both government and industry. When shall we realize this?

3.14. There is no affiliating system abroad. In India is rampant. It has killed the innovation capacity of students. It has promoted mediocrity.

Inbreeding in higher education is taking place. University Acts are obsolete. Governor of a state who is not an academician but a politician is at helm of affairs, as the chancellor of universities. He appoints vice chancellors mostly under political pressures, who are misfits. He inducts politics in universities. The situation perpetuates down below. This has resulted in mediocrity. Blame is wrongly passed on to professors. Policy makers and the chancellors are truly at fault. The situation demands immediate change. We need to adopt international visions to improve. There are no affiliated colleges in developed countries. Every college from its beginning is autonomous.

3.15. There is more number of technical universities abroad. India has very few.

Almost half of universities in US are technical. Germany has more than 84 technical universities. So is the case in Japan. It is observed that those nations which have more of technical universities have capitalized technology more effectively. India has more multi faculty universities, which is an outdated model. In these universities Technical discipline does not get a deal it deserves. Hence it lags behind the world. AICTE has recommended

establishment of exclusive technical universities. However in most of the states there is only one technical university and many colleges are affiliated to it. It creates monopoly and bureaucracy. As a result investment made by colleges and efforts made by faculty and students do not fetch returns they deserve. Agriculture Universities which were set up in sixties developed new varieties of seeds, which have resulted in increased food production. Technical Universities should not be only examination bodies awarding degrees but should generate new technologies and improve industrial production. Future of younger generation is linked up with creation of technical universities.

4.0 CONCLUSION

India after globalization is booming with opportunities. Indian economy is fast reforming. In this period, Institutions, universities need to have world class visions to enable people to grow.

The paper has identified only a few gaps, which are critical and need to be attended to forthwith. Without which higher education will not fulfill the growing aspirations of people. Opportunities do not last longer. They do not wait. Achieving the declared dream of India to become a developed country by the year 2020 depends on how ably and urgently we initiate steps to make up the gaps.

Good ideas are available not only in India but also abroad. We should not close our eyes and ears to them. We should respect and not miss to benefit from them. Foreign collaborations are necessary. Mobility of professors to world best universities must be planned on priority.

In today's knowledge society we must not forget to recognize the importance of IPR. Creation of favorable environment for the same should be our top priority.

Rapid upgradation of higher education

institutes and universities in the light of experiences in the world should urgently be taken up. There is nothing more urgent for India at this juncture of time than reviving higher education

REFERENCES

1. Fang Zaho, Academic Entrepreneurship, Case study of Australian universities, Published in International Journal of Entrepreneurship and innovation, pp 91-97, IP Publishing Ltd. Vol 5 number 2 2nd May 2004
2. B M Naik, Needed – Innovation and Entrepreneurship in Higher Education Institutes, published in Indian journal Of Technical Education, January- March 2004 Vol 27, number 1, pp 27-32
3. Green paper of European Union on Innovation and technological transfer Enterprise Unit DG, EUFO, 2295-2920 Luxemburg.
4. Pankaj Jalote, An Opportunity To Scale Up the IITs, Economic Times, 26 April 2007
5. B M Naik, Privatization of Technical Education, Identification of Risk factors, and their Management- making Education affordable, Journal on Engineering and Technology, i-manager publications, volume 1, No 2
6. James J Duderstadt, " A university for twenty first century. The University of Michigan Press
7. Derek Bok, Universities in the Market Place, The Commercialization of Higher Education, Princeton University Press Princeton New Jersey.
8. Clark Kerr and Marion L Gade, Association of College Boards of Universities of America., " The Guardians, Boards of Trustees of American universities and Colleges, What They Do

and How Well they Do It.

9. William G Bowen and Derek Bok, Princeton university press, "The Shape of The River, long Term consequences Of Considering race in College and university admissions.

10. B M Naik Book, " New Vistas in Technical Education, Vivek publication, Aurangabad
11. V Raghunathan, "India Needs More quality PhDs", published in economic Times.



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